## II. AMENDMENTS TO THE CLAIMS

Claim 1. (currently amended) A sensor adapted to sense the angular position of a rotatable shaft, the sensor comprising:

an annular magnet connected for rotation coaxial with the shaft; the annular magnet having been magnetized according a method comprising ~~the step of temporarily~~ inserting an iron core through its inside diameter during magnetization thereof to obtain enhanced linearity of magnetic flux density as the magnet rotates about its center axis;

a first stationary magnetic field sensor element positioned to sense the change in magnetic flux as the magnet rotates and adapted to provide an output signal proportional to the magnetic flux sensed; and

an amplifier circuit operable to amplify the output signal from the sensor element and to provide an output signal having a magnitude proportional to the angular position of the shaft.

Claim 2. (currently amended) The sensor as defined in claim 1 further comprising a magnetic-shield housing, and in which said shaft extends through the housing and through the center of the annular magnet, and the sensor element is ~~are~~ located in the housing outwardly of ~~around~~ the magnet~~shaft~~.

Claim 3. (original) The sensor as defined in claim 1 further comprising a second magnetic field sensor element spaced 180 degrees from said first sensor element, and in which the annular magnet is magnetized with two radial poles spaced 180 degrees apart.

Claim 4. (currently amended) The sensor as defined in claim 3 in which said method includes the step of sizing the magnet to obtain ~~for~~ enhanced linearity of magnetic flux density as the magnet rotates through ~~over a range of~~ approximately +/- 60 degrees ~~of rotation~~ from a neutral position equi-distance between said poles.

Claim 5. (currently amended) The sensor as defined in claim 4 in which the amplifier circuit provides a differential output voltage that varies linearly with shaft rotation of approximately +/- 60 degrees from said neutral position.

Claim 6. (original) The sensor as defined in claim 5 in which the differential output voltages are referenced to a desired voltage level.

Claim 7. (currently amended) The sensor as defined in claim 5 in which the amplifier circuit includes an input network resistor to produce an amplified and noise-filtered output signal proportional to shaft angle through said approximately ~~for~~ +/- 60-degrees of rotation from said neutral position.

Claim 8. (currently amended) The sensor as defined in claim 5 in which the amplifier circuit includes an input network capacitor to produce an amplified and noise-filtered output signal proportional to the shaft rate of rotation through said approximately ~~for~~ +/- 60 degrees of rotation from said neutral position.

Claim 9. (currently amended) A sensor adapted to sense the angular position <u>or speed</u> of a rotatable shaft, the sensor comprising:

a bipolar annular magnet connected for rotation coaxial with the shaft; the annular magnet having its poles located 180 degrees apart and having been magnetized according a method comprising ~~the step of temporarily~~ inserting an iron core through its inside diameter <u>during magnetization thereof</u> to obtain enhanced linearity of flux density <u>as the magnet rotates about its center axis through</u> ~~over a range of~~ approximately +/- 60 degrees ~~of rotation~~ from a neutral position equi-distance between the poles;

three pairs of magnetic field sensor elements positioned to sense the change in magnetic flux as the magnet rotates; the pairs of sensor elements being operatively spaced 120 degrees apart and adapted to provide differential signals that are 120 degrees out of phase with each other as the magnet rotates; said differential signals comprising linear segments having magnitudes proportional to the angular position of the shaft for 120 degree increments of shaft rotation;

a commutation circuit receiving said differential signals and providing logic signals indicative of said linear segments; and

an output block receiving said logic signals and said linear segments, and adapted to provide an output signal therefrom, the output signal having a magnitude proportional to one of (i) the angular position and (ii) the rate of rotation of the shaft.

Claim 10. (original) The sensor as defined in claim 9 in which the commutation circuit is operative to provide said logic signals based on the signal polarity of said differential signals, and in which said output block is operative to select said linear segments based on said logic signals and to provide said output signal comprising said selected linear segments.

Claim 11.(original) The sensor as defined in claim 10 in which the commutation circuit comprises comparators operative to provide said logic signals in the form of high-low signals from the signal polarity of said differential signals.

Claim 12. (original) The sensor as defined in claim 11 in which the high-low logic signals are manipulated by four NOR gates prior to said output block, two of said NOR gates being configured to function as logic inverters.

Claim 13. (original) The sensor as defined in claim 12 in which said output block includes a multiplexer receiving said high-low logic signals from said NOR gates, said multiplexer being operative to selectively switch said linear segments to a common port in response to said high-low logic signals to establish said output signal comprised of said switched linear segments.

Claim 14. (original) The sensor as defined in claim 9 further comprising an amplifier circuit receiving said differential signals and supplying said differential signals to said commutation circuit in the form of amplified differential signals, the amplifier circuit including an input network capacitor adapted to produce said amplified signals proportional to the shaft rate of rotation through 360 degrees of rotation.

Claim 15. (original) The sensor as defined in claim 14 in which the input network further comprises input resistors biased to provide equal amplified linear segments at intermediate switch points therebetween and an output voltage which is proportional to shaft rotational angle for a full 360-degree rotation.

Claim 16. (original) The sensor as defined in claim 11 in which said output block includes a microcomputer operative to establish signal switching points in response to said logic signals, and to provide said output signal comprised of said linear segments merged at said signal switching points.

Claim 17. (original) The sensor as defined in claim 16 in which the microcomputer establishes said signal-switching points in response to shaft rotation.

Claim 18. (original) The sensor as defined in claim 16 in which the microcomputer stores the voltage difference between said switch points and provides gain correction factors to each linear segment.

Claim 19. (currently amended) The sensor as defined in claim 16 in which the microprocessor numerically ~~numerical~~ biases said linear segments to mathematically match the segments at said switch points.

Claim 20. (original) The sensor as defined in claim 16 in which the microprocessor is operative to calculate the rate of change of position and provide said output signal proportional thereto.

Claim 21. (currently amended) A sensor adapted to sense the angular position of a rotatable shaft, the sensor comprising:

a bipolar annular magnet connected for rotation coaxial with the shaft; the annular magnet having its poles located 180 degrees apart and having been magnetized according a method comprising ~~the step of temporarily~~ inserting an iron core through its inside diameter during magnetization thereof to obtain enhanced linearity of flux density as the magnet rotates about its center axis through ~~over a range of~~ approximately +/- 60 degrees ~~of rotation~~ from a neutral position equidistant ~~equi-distance~~ between the poles;

three pairs of magnetic field sensor elements positioned to sense the change in magnetic flux as the magnet rotates; the pairs of sensor elements being operatively spaced 120 degrees apart and adapted to provide differential signals that are 120 degrees out of phase with each other as the magnet rotates; said differential signals comprising linear segments having magnitudes proportional to the angular position of the shaft for 120 degree increments of shaft rotation;

an amplifier circuit operable to amplify the differential signals; and

a microprocessor-based circuit receiving said amplified differential signals and operative to provide an output signal proportional to one of shaft angular position and shaft speed through 360 degrees of shaft rotation.

Claim 22. (new) A sensor adapted to sense the angular position of a rotatable shaft, the sensor comprising:

an annular magnet having two poles on its outer diameter and connected around the shaft for rotation therewith such that the shaft extends through the center of the annular magnet; the annular magnet having been magnetized according a method comprising inserting an iron core through its inside diameter during magnetization thereof to obtain enhanced linearity of magnetic flux density as the magnet rotates about its center axis;

a pair of angularly spaced magnetic field sensor elements positioned radially outwardly of the annular magnet to sense the change in magnetic flux as the magnet rotates, and to provide an output signal indicative of the magnetic flux sensed; and

an amplifier circuit operable to amplify the output signals from the sensor elements and to provide an output signal having a magnitude proportional to the angular position of the shaft.